Biological Evaluation

Ediz Hook Beach Nourishment and Revetment Maintenance

Clallam County, Washington
March 2002

US Army Corps of Engineers®
Seattle District

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TABLES AND FIGURES

*WDFW has required that the Corps not widely disseminate information on sensitive species contained in their Priority Habitats and Species database as a condition of Corps use of that database. Therefore, Figures 3 and 4 are included only in copies of this document sent to NMFS and USFWS.

1. INTRODUCTION

In 1977 and 1978, the U.S. Army Corps of Engineers, Seattle District (Corps) constructed the Ediz Hook Beach Erosion Control Project. The erosion project consists of a rock revetment and a beach nourishment program. The purpose of the project is to protect the sand spit from erosion, thereby maintaining protection of Port Angeles Harbor and the small boat basin from direct wave action, and preserving access to a U.S. Coast Guard station located at the tip of the spit. Beach nourishment is necessary because of reduction in sand, gravel, and cobble materials carried to the spit via longshore currents due to shoreline armoring along the toe of feeder bluffs west of Ediz Hook, and two dams on the Elwha River.

During the summer of 2002, the Corps is planning to perform routine maintenance work on the erosion control project (Figures 1 and 2). The proposed work includes: (1) nourishing the spit's beach using gravels and cobbles obtained from an existing upland gravel pit, and (2) re-keying easily accessible revetment rocks that have fallen onto the beach. In accordance with Section 7(a)(2) of the Endangered Species Act of 1973, as amended, this document examines the potential impacts of this work on species protected by the Act.

1.1 Location

Ediz Hook is located in Port Angeles, Clallam County, Washington (T30N, R06W, Sections 32, 33, and 34). The spit extends into the Strait of Juan de Fuca, forming Port Angeles Harbor. Please see Figure 1.

1.2 Authority

The Ediz Hook Beach Erosion Control Project was authorized by Section 4 of the 1974 Water Resources Development Act (Public Law 93-251). The authorization included construction and maintenance of rock protection, as well as initial and periodic beach nourishment. At the time the project was authorized, planned maintenance included a beach nourishment program where approximately 100,000 cubic yards of material would be placed every five years. The erosion control project was originally constructed in 1977-78. Renourishment occurred in 1985 (30,000 cubic yards), 1991, and 1997 (34,000 cubic yards). A lack of funding prevents the Corps from placing the authorized 100,000 cubic yards every five years.

2. DESCRIPTION OF THE PROJECT AREA AND ACTION AREA

The action area for the proposed project is comprised of the upland portions of Ediz Hook, the beach on the western side of the spit, and adjacent Strait waters out to the –20' MLLW depth contour (where the active sediment transport zone ends).

Ediz Hook is a 3.5-mile long natural spit formed by the eastward movement of littoral sand, gravel, and cobbles from eroding sea cliffs immediately to the west and from river borne sediments of the Elwha River. Please see Photos 1, 2, and 3 in Appendix A. The spit has an average top elevation of +14' mean lower low water (MLLW)[1], with widths ranging from 90 feet to 750 feet.

[1] The mean higher high water datum at this location is +7.10' MLLW. The highest estimated tide is ~11' MLLW.

The Hook provides a natural breakwater, forming and protecting Port Angeles Harbor from northerly and westerly wave attack. Port Angeles Harbor is the only deep-draft harbor on the northern shore of the Olympic Peninsula; it is easily accessible to the largest vessels due to its natural depths of up to 192 feet. Licensed pilots in Port Angeles board almost all ships destined

for Puget Sound ports. Port Angeles Harbor also provides moorage for log ships, oil tankers, recreational fishers, crabbers and shrimpers.

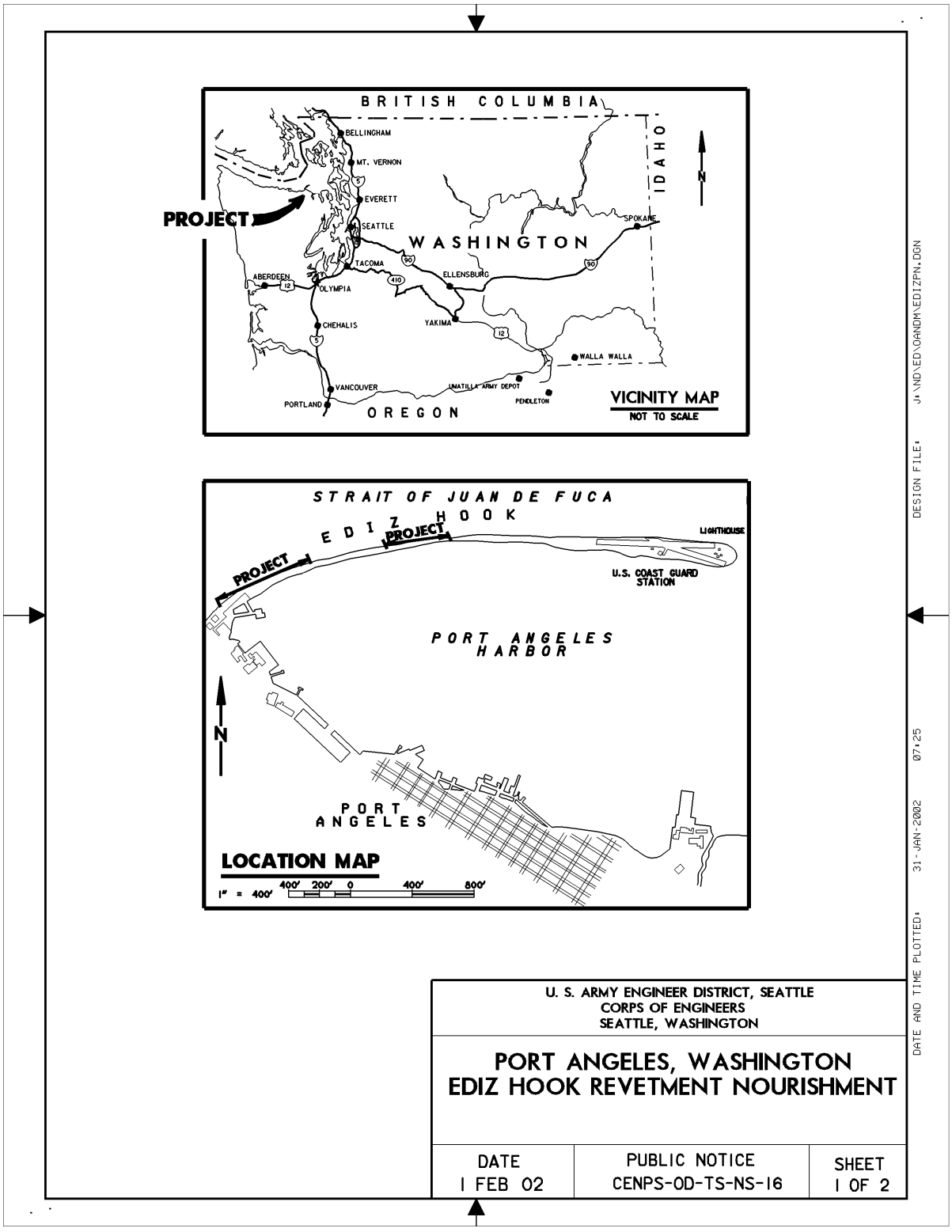
Coast Guard Group Port Angeles

The U.S. Coast Guard air-sea rescue station that serves Washington's coastal and inland waters lies on the seaward end of Ediz Hook (see Photo 2 in Appendix A). Established in 1935, Group Port Angeles is the nation's oldest U.S. Coast Guard (USCG) station. There are approximately 200 men and women based at this station, including a helicopter rescue crew. The base has a military exchange, a new medical clinic, an administrative building, and temporary quarters for personnel during their 24-hour shifts. Personnel operate an around-the-clock communications center inside the administrative building. The base has a 4,000 foot long runway used in the training of Coast Guard helicopter pilots and crew. The runway is considered too short and narrow for larger-aircraft landings, although larger cargo planes have occasionally used it to land. Logs thrown up by storms and large flocks of sea gulls make the runway hazardous.

Daishowa America

Daishowa America Company, Ltd. owns and operates a paper mill on the landward end of Ediz Hook (see Photo 1 in Appendix A). The mill manufactures telephone directory paper and wood chips. The mill has been operated since the early 1920s. More than 300 people are currently employed at the mill site. Telephone directory paper is produced using a mixture of mechanically made pulp, pulp from recycled waste paper, purchased chemical pulp, and clay. There is no kraft pulping and no sulfite pulping done at this facility. The other product from the facility is woodchips, mainly for export. All of the raw materials for this operation have to be purchased as Daishowa does not own any timberland.

Figure 1. Location and Vicinity Map



3. DESCRIPTION OF THE PROPOSED ACTION

Beach nourishment material will be placed along the face of the revetment at the two cross-hatched stockpile locations shown on the plan view in Figure 2. The nourishment material, consisting of about 50,000 tons (approximately 34,500 cubic yards) of 1- to 12- inch[2] rounded gravel and cobble from an existing upland gravel pit, will be brought to the stockpile areas by 20-cubic yard end-dump trucks. The trucks will dump their loads between the revetment and the mean lower low water depth contour, creating a series of berms extending approximately 50 feet seaward from the revetment face. Approximately 7 cubic yards of material will be placed per linear foot of beach. The waterward face of the stockpile will not be graded; instead, it will be allowed to reach a natural angle of repose, likely on the order of 1.5:1 or 2:1 (see the cross section in Figure 2). However, a small bulldozer may be used to spread material laterally along the top of stockpiles to allow for dump truck access.

Each of the two stockpiles will have a single access point, created by removal of revetment stones. These stones will be side cast landward of the revetment. These temporary breaches in the revetment will be restored before equipment demobilization. A small equipment staging area will be located on an existing concrete/gravel pad adjacent to the Daishowa mill.

A small end-effect erosion area at the waterward tip of the revetment and adjacent to the east end of the Coast Guard runway (near station 10+00) will also be nourished with 10- to 12- inch cobbles (see Figure 2 and Photos 2, 6). In this area, tidal and wave energy have created a large scour hole where the revetment abuts the unarmored beach.

In all, approximately 5 acres of cobble habitat between elevations 0' and +12' MLLW will be directly affected by the creation of the stockpiles. Once on the beach, the nourishment material is expected to disperse over the entire spit rapidly. During previous nourishment projects, the stockpiles began to erode immediately; material was washed away from the stockpiles during each tidal cycle such that the cross-section shown on Figure 2 was never achieved.

Along the main revetment, an estimated 500 armor rocks have been displaced from the revetment face and toe section (see Photo 4). Those rocks that are readily accessible will be rekeyed into the existing armor section. This work will involve the use of a track-mounted backhoe working on the beach. Stones will be removed from approximately 13,300 feet of beach during low tides. No new rock will be placed on the revetment as part of the proposed action.

The proposed maintenance work will occur between July 16 and mid- to late-September, 2002. During the last maintenance project in 1997, it took contractors 27 working days (10 hours/day) to complete work of a similar scope.

[2] The contract specifications will require that the gravel and cobbles shall be washed, rounded to sub rounded, and well graded with at least 50% (by weight) greater than 3 inches, and not more than 5% passing the 1-inch mesh sieve, and not more than 10% passing the No. 200 mesh sieve (fine sand). The portion passing the No. 200 mesh sieve shall not contain clay materials.

4. CONSERVATION MEASURES

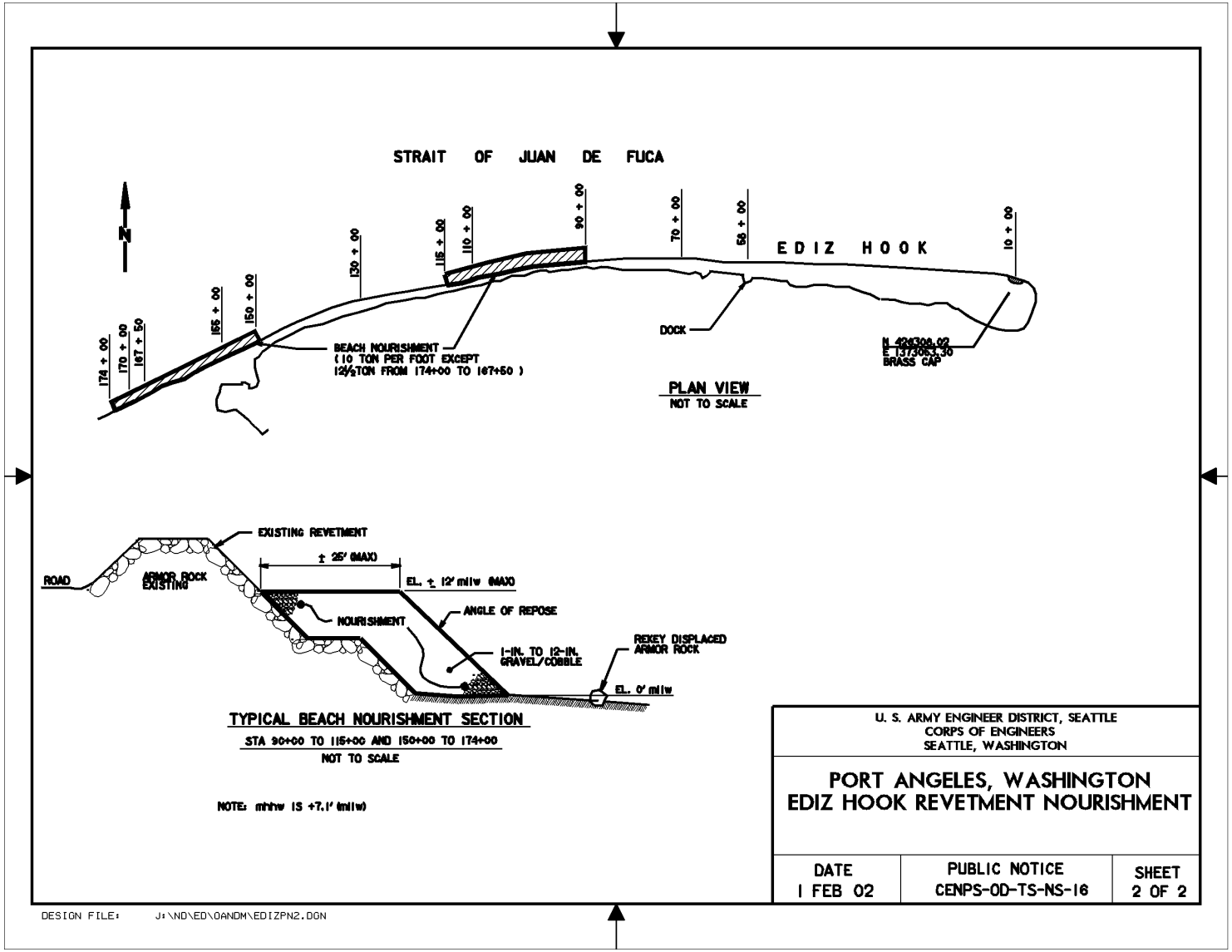
Construction will occur when chinook, Hood Canal chum, and bull trout are least likely to be present in the action area. The work window is outside of the USFWS closure period for bull trout in Puget Sound marine waters (February 16 - July 15), the NMFS closure period for chinook in Puget Sound marine waters (March 1 – July 1), and the NMFS closure period for Hood Canal chum in marine waters (March 1 – July 15). The work will also occur outside bald eagle wintering season (October 31 – February 31).

No in-water work will occur. The placement of the nourishment materials and all rock removal and re-keying work will be timed to avoid periods when tidal waters have inundated the project site.

In addition, several construction best management practices (BMPs) will be implemented:

- use of motorized equipment on the beach will be minimized, with a single access point for each stockpile area and a 50' work corridor waterward of the armor rocks;
- some large woody debris may be removed from the nourishment stockpile areas prior to gravel/cobble placement, but any logs would be moved to adjacent beach areas instead of off-site;
- drive trains of equipment will not operate in the water;
- biodegradable hydraulic fluids will be used for machinery at the site;
- at least one fuel spill kit with absorbent pads will be onsite at all times; and
- no equipment fueling or servicing will occur within 300 feet of the water.

Figure 2. Plan and Section Views



5. ENVIRONMENTAL BASELINE AND EFFECTS OF THE PROPOSED ACTION

5.1 Habitat Conditions

According to the WRIA 18 Habitat Limiting Factors Report, estuarine and marine habitats in the vicinity of the proposed project are degraded as a result of: (1) physical alteration of natural estuaries, (2) significant alteration of nearshore ecological function due to shoreline armoring, (3) and poor water quality in Port Angeles Harbor (Washington State Conservation Commission 1999).

Shoreline Condition and Habitat Diversity

The northern shore of Ediz Hook is characterized by an armor stone revetment fronted by a narrow beach of cobbles, gravel, and patches of sand. Large woody debris accumulates on the upper beach and revetment, along with a wrack of surf-thrown bull kelp (*Nereocystis luetkeana*), *Pterygophora californica*, *Laminaria* sp., and other macroalgae. Some large armor stone has toppled from the revetment face and is partially buried on the beach. The overstory kelp *N. luetkeana* is visible offshore.

Directly landward of the revetment is a 2-lane road. Very little vegetation is present between the revetment and curb (Photo 5). No trees are present on the spit, other than some shore pines (*Pinus contorta*) planted near the Coast Guard administrative buildings. The southern shore of the spit is in a more natural condition, with the exception of a public boat launch and partial revetment. Two Port Angeles city parks are located on Ediz Hook. Harborview Park offers a picnic area, while Sail & Paddle Park offers a picnic area, water access, boat launch for non-motorized watercraft, and an open area.

A query of the WDFW priority habitats and species database indicates that eelgrass bed(s) and a sand lance spawning area are located on the Port Angeles Harbor side of Ediz Hook. Other priority habitats present in Port Angeles Harbor include a harbor seal haul-out area, shorebird concentration area. Please see Figures 3 and 4.

The proposed action will not alter baseline shoreline conditions along Ediz Hook. The project will have no effect on the state-designated priority habitats which occur on the harbor side of the spit. A temporary increase in truck traffic will occur during construction, raising noise levels above ambient condition. Heavy equipment will work on the beach while removing partially buried armor stones, but no extensive excavation will occur and any resulting holes will be naturally re-graded within one or two tide cycles. Given the large percentage of cobbles present on the beach, equipment tracks are not expected to damage the beach. During the last maintenance project in 1997, it took contractors only 3 days working at low tides to remove and re-key 500 stones.

Littoral Sediment Transport

Erosion at Ediz Hook is thought to be symptomatic of a reduction in sand, gravel, and cobble materials carried to the spit via longshore currents. The reduction in sediment transport can be at least partially attributed to two factors: a municipal drinking water/industrial supply water line

and associated shoreline armoring running along the toe of feeder bluffs west of Ediz Hook, and two dams on the Elwha River.

The dams have limited coarse-grained sediment and woody debris from flowing downstream of river mile 13.4, the location of Glines Canyon Dam. As a result, cobbles, gravel, and sand have built up in deltas where the river or tributaries enter the reservoirs. In 1994, it was estimated that approximately 17 million cubic yards of clay, silt, sand, gravel, and cobbles were trapped in the two reservoirs, most behind Glines Canyon Dam (Olympic National Park 1995). In addition to contributing to erosion at Ediz Hook, reduced sediment supply has caused the eastern edge of the pre-dam Elwha delta to erode, and the barrier beach at Freshwater Bay to recede and steepen.

Beach nourishment material will be placed as high as possible in the intertidal zone, thereby mimicking natural sediment erosion and transport processes to the maximum extent practicable. The predominant longshore movement of littoral drift is in a west-to-east direction toward deeper water at the east end of the Hook. Deep waters at the east end of the Hook have and will continue to intercept the littoral drift; thus, no change to downdrift beaches east of Ediz Hook will occur as a result of the project.

Substrate and Bathymetry

The beach fronting the revetment is largely composed of cobbles, with some patches of gravel and coarse sand present (see Photos 7 and 8). Anecdotal information suggests that historically beaches along the Ediz Hook shoreline were composed of more sand than is present today (Shaffer, pers. comm.).

The revetment, along with the reduction in sediment available to naturally feed the beach, has resulted in a steepening of the beach profile. The proposed nourishment project would delay the conversion of the beach fronting the revetment from a high intertidal beach to a subtidal beach. In addition to protecting the integrity of the revetment, maintenance of a higher, more gently graded beach profile would maintain the range of intertidal elevations necessary to support the epibenthic invertebrates which serve as prey for a wide variety of marine fishes.

Bathymetric surveys conducted prior to and after past nourishment activities showed a restored beach profile above –10’ MLLW, with little change in the beach profile between –10’ and –20’ MLLW. Generally, no trace of the nourishment materials remains after two winter seasons. The deep water to the east of Ediz Hook has and will continue to intercept the littoral drift. Therefore, no change to beaches east of Ediz Hook will occur as a result of the project.

The nourishment material grain size gradation will be slightly coarser than that of the native material, particularly along the seaward tip of the spit where sediment sizes are somewhat smaller than those at the base. WDFW has encouraged the Corps to use a larger proportion of coarse sand and gravels less than one inch in diameter in the nourishment materials. However, fine material tends to be unstable on the beach, moving rapidly offshore where it is distributed over broad areas, providing little or no functional use in beach erosion control or storm protection. When material consisting of a mixture of cobbles, gravel, coarse sand, fine sand, and silt is used as beach fill, natural sorting processes act upon it, redistributing the finer material offshore and developing a coarser grained residual on the beach face and in the surf zone (Corps

1976). The Corps' authority for this nourishment program is to protect the revetment structure from being undermined by storm waves. Larger sized material will be more resistant to erosion, thereby remaining in the littoral system longer and reducing replenishment frequency. Since the quantity of material placed will be measured by tonnage, any change in the contract specification which would result in a greater proportion of fines would result in a corresponding decrease in the larger material necessary to protect the structural integrity of the revetment. The existing benthic community is composed of organisms that can tolerate exposed conditions with high sediment transport rates and variable substrate composition. Therefore, a shift in benthic assemblage composition due to the use of nourishment material slightly coarser than native material is not expected.

5.2 Water and Sediment Quality

Port Angeles Harbor has been contaminated by decades of industrial activity, particularly pulp mills. Contaminants of concern include petroleum hydrocarbons, PCBs, lead, and dioxins/furans. Wood waste covers approximately 25 percent (500 acres) of the bottom of Port Angeles Harbor, primarily in nearshore log booming areas. The 75 acre Rayonier Mill was the largest in the area. It operated for 67 years prior to closing in 1967. The pulp mills discharged wastewater directly into Port Angeles Harbor until the 1970s when primary and secondary treatment systems were established and discharges were routed through a deep-water outfall.

Any increases in turbidity resulting from the proposed action would be minor considering the large grain sizes of the nourishment material. The nourishment materials will be washed at the quarry so that the percentage of fines will be quite low (less than 3% by weight). Any sediment plumes attributable to the project would be temporary, localized, and equivalent to those created by natural sediment transport processes. With respect to chemical contamination, the proposed action will not affect baseline conditions for this indicator.

5.3 Biota

Macroalgae

The algal communities of kelp beds in the vicinity of Ediz Hook shift seasonally, and consist of an overstory of the annual brown kelp *Nereocystis luetkeana*, commonly known as bull kelp, and a varied understory of Laminariales and fleshy red algae (Shaffer 1998). *N. luetkeana* densities are highest in the summer and fall months, while fleshy red algae are seasonally present in the winter and spring months (Shaffer 2000). The perennial brown algae *Pterygophora californica* is the dominant understory component of *Nereocystis* beds in this area of Strait (Shaffer 2000).

Shaffer and Parks (1994) described the response of a Puget Sound nearshore *Nereocystis* bed to sedimentation associated with a medium scale landslide in 1991. This study was undertaken because previous research had indicated that turbidity may result in subthreshold light levels for gametogenisis and sporophyte production, as well as gametophyte smothering. The extent to which these factors could lead to increased mortality and changes in northwest kelp bed densities, distribution, and community composition following a landslide was unclear.

The landslide occurred in April, and plumes of sediment were seen over the kelp bed for weeks following the slide. Since it was known that *Nereocystis* recolonization begins during early spring months with the onset of sporophyte growth, and that initiation of sporophyte growth is controlled by light and will be delayed at suboptimal light levels, Shaffer and Parks predicted that differences in understory algal composition and density of brown algae would be seen in the affected kelp bed compared to a control bed. The results of Shaffer and Parks' study supported one of these hypotheses but not the other. They found that species composition in the affected bed resembled that in the control, with the same dominant species present in each season after the landslide. But densities of the three dominant species were significantly different in the spring. Shaffer and Parks attributed this difference to a delay of sporophyte growth due to a decrease in surface irradiance in the affected bed, rather than increased gametophyte or young sporophyte mortality which would have been more likely to result in a more significant reduction in plant densities or a shift in species composition. By summer, the densities of the three dominant kelp taxa and algal percent cover in the two beds were indistinguishable.

The proposed project is not expected to have a significant affect on the kelp bed offshore of the Ediz Hook revetment for two reasons. First, the nourishment material will be placed upon the beach adjacent to the kelp bed during mid-summer months. Algae are most vulnerable to sediment impacts during spring months, when sporophyte growth is triggered by increasing light levels (Shaffer and Parks 1994). Second, the landslide evaluated by Shaffer and Parks originated from a hill slope composed of a gravelly sandy loam overlaying a weakly consolidated till (gravel 65%, sand 23%, silt 12%). The nourishment materials used on Ediz Hook will have a coarser grain size and therefore are not expected to remain suspended in the water column for very long. This reduces the chance for subthreshold light levels that could affect growth rates of the mature *N. luetkeana* sporophytes or the initiation of gametogenesis later in the summer.

Benthic Epifauna

Nyblade (1978) sampled intertidal and shallow subtidal benthos at ten sites along the Strait of Juan de Fuca in order to document the distribution, abundance, and seasonal variation of flora and fauna in areas representative of the range of habitats present. The sites were sampled quarterly over the course of one year, at high (+6' MLLW), mid (+3' MLLW), and low (0' MLLW) intertidal strata.

Nyblade's Morse Creek exposed cobble and Dungeness Spit exposed gravel study areas are the sites most similar to the Ediz Hook action area, and are the sites closest to the project area geographically (see Figure 3). The Morse Creek study area differs from the Ediz Hook action area two ways. The cobbles at the +6' strata were buried with sand, and the site had a gentle slope and more moderate wave activity than Ediz Hook. At the Dungeness Spit study area, the substrate grain size was smaller than along most of Ediz Hook but the moderate slope and extreme wave exposure better compare to conditions in the action area.

During preparation of this biological evaluation, Nyblade's data was compared to Simenstad et al. (1977) to focus our review of potential benthic effects on only those organisms which serve as prey for juvenile salmonids and forage fish. The Simenstad study was part of the same NOAA research effort and documented nearshore fish assemblages and their food habits along the Strait of Juan de Fuca. Simenstad also had study sites located at Morse Creek and Dungeness Spit.

Although almost 25 years old, these data sets provide some useful information on the types of organisms likely to be affected by the proposed action.

The only benthic prey items reported both by Simenstad (in Strait-wide salmonid and forage fish stomach samples) and Nyblade (in Morse Creek and Dungeness Spit benthos samples) were gammarid amphipods and dipteran larvae. Gammarid amphipods were present in all strata at both the Morse Creek and Dungeness Spit sites. Amphipod distribution tended to be very patchy at both sites, and densities showed dramatic peaks in the summer quarter (see Table 2.). Dipteran larvae were present only in the +3' MLLW stratum at Morse Creek. Densities ranged from a low of 8 per m^2 in the spring to a high of 2152 per m^2 in fall.

Table 1. Gammarid Amphipod Densities per m^2 (Nyblade 1978)

	Spring	Summer	Fall	Winter
Morse Creek +6'	95	8605	2670	105
Morse Creek +3'	20	113	6650	5395
Morse Creek 0'	430	428	660	805
Dungeness Spit +6'	8	30	4	0
Dungeness Spit +3'	24	320	20	0
Dungeness Spit 0'	48	6	0	0

We would expect amphipod densities along Ediz Hook to generally be lower than those at Morse Creek, but perhaps a little higher than those at Dungeness Spit. This is because Ediz Hook is subject to a more severe wave climate than Morse Creek and has coarser substrates, which tend to more conducive to higher amphipod production, than Dungeness Spit.

The proposed action will affect epibenthic prey organisms within and adjacent to the 5 acre beach nourishment footprint. Many organisms will be covered and will not survive; others could survive, depending on the rate of beach nourishment material movement, thickness of the material, and species mobility/tolerance to burial. Excavation of armor stones on the beach will also result in localized disturbance which may result in mortality. The movement of nourishment materials to adjacent beach areas, both laterally and seaward, will occur but will mimic the movement of native beach materials due to tidal action, waves, and storms. It is expected that most populations offshore of the fill would not be significantly affected by such gradual offshore accumulation, except in the case of a major offshore movement due to storm events. The existing benthic community is composed of organisms that can tolerate exposed conditions and should withstand abrasive forces.

The proposed action will degrade baseline conditions for this indicator, but only temporarily. Amphipods are mobile epifauna that are adapted to heavy disturbance regimes, and are thus expected to recolonize the nourishment area quickly. The scale of mortality impacts which will result from the proposed project are not likely to affect amphipod population dynamics in the action area. Likewise, a shift in benthic assemblage composition due to the use of nourishment material slightly coarser than native material is not expected. The nourishment material will be

placed along Ediz Hook soon after the end of the juvenile salmonid outmigration period. This schedule will allow for maximum recovery of the epibenthos prior to the 2003 salmonid outmigration.

Forage Fish

Information on usage of the action area by forage fish was obtained from the WDFW Marine Resources Database. The location of documented forage fish spawning areas in the vicinity of the project is shown in Figures 3 and 4. A sand lance spawning area is located along the protected Harbor side of Ediz Hook.

Simenstad et al. (1977) found Pacific herring to be the dominant neritic species captured by townet at 7 nearshore sites along the Strait of Juan de Fuca. Herring were the most abundant species captured, and were present in 26 of 28 collections. Herring occurred primarily as larvae during the spring and as juveniles throughout the rest of the year. No adult herring were caught as part of the Simenstad study. The herring juveniles captured by Simenstad et al. (1977) were almost exclusively planktivores, with calanoid copepods and mysids composing the bulk of the biomass and total number of prey. Calanoid copepods also dominated the prey spectrum for surf smelt and sand lance. Gammarid amphipods and other epibenthic crustaceans were also frequently observed in surf smelt stomachs, but did not appear to contribute significantly to their overall diet.

Forage fish will not be directly impacted by the proposed action for two reasons. First, placement of the nourishment materials will occur above the waterline at low tides so as not to interfere with fish usage of beach habitat. Second, turbidity is not expected to increase substantially above ambient conditions due to the large grain size of the material. Indirect effects are also not anticipated since no documented spawning beaches occur in the action area, and the epibenthic fauna which will be impacted by material placement do not appear to constitute a significant fraction of these species' diet.

6. EVALUATION OF PROJECT EFFECTS ON PROTECTED SPECIES

Six species protected under the Endangered Species Act of 1973 (16 USC 1531-1544) potentially occur in the project vicinity. A list of species potentially affected by the proposed project was requested from the U.S. Fish and Wildlife Service (USFWS) in a letter dated October 24, 2001. A species list was received on November 30, 2001 (FWS Ref: 1-3-02-SP-0219). National Marine Fisheries Service (NMFS) Northwest Region web sites (*http://www.nwr.noaa.gov/1habcon/habweb/listnwr.htm* and *http://www.nwr.noaa.gov/1seals/marmamlist.html*) were consulted on November 30, 2001 to determine which species under NMFS jurisdiction potentially occur in the project area. Table 2 summarizes the information received from USFWS and NMFS. The following sections briefly summarize relevant life history information on the protected species, synthesize current knowledge on the presence and utilization of the project and action areas by these species, and then evaluate how the proposed project may affect the species concluding with a determination of effect.

Table 2. Protected Species Potentially Occurring in the Project Vicinity

Species	Listing Status	Critical Habitat
Bald Eagle *Haliaeetus leucocephalus*	Threatened	—
Marbled Murrelet *Brachyramphus marmoratus*	Threatened	Designated
Coastal/Puget Sound Bull Trout *Salvelinus confluentus*	Threatened	—
Puget Sound Chinook Salmon *Oncorhynchus tshawytscha*	Threatened	Designated
Hood Canal Summer-Run Chum Salmon *Oncorhynchus keta*	Threatened	Designated
Steller Sea Lion *Eumetopias jubatus*	Threatened	Designated
Humpback Whale *Megaptera novaeangliae*	Endangered	—
Leatherback Sea Turtle *Dermochelys coriacea*	Endangered	Designated
Puget Sound/Strait of Georgia Coho Salmon *Oncorhynchus kisutch*	Candidate	—

6.1 Bald Eagle

The Washington State bald eagle population was listed as threatened under the Endangered Species Act of 1973, as amended, in February 1978. Since DDT was banned in 1972, bald eagle populations have rebounded. The bald eagle was proposed for de-listing in July 1999.

The bald eagle wintering season extends from October 31 through March 31. Food is recognized as the essential habitat requirement affecting winter numbers and distribution of bald eagles. Other wintering habitat considerations are communal night roosts and perches. Generally large, tall, and decadent stands of trees on slopes with northerly exposures are used for roosting; eagles tend to roost in older trees with broken crowns and open branching (Watson and Pierce 1998). Bald eagles select perches on the basis of exposure, and proximity to food sources. Trees are preferred over other types of perches, which may include pilings, fence posts, power line poles, the ground, rock outcrops, and logs (Steenhof 1978).

Bald eagles nest between early January and mid-August. The characteristic features of bald eagle breeding habitat are nest sites, perch trees, and available prey. Bald eagles primarily nest in uneven-aged, multi-storied stands with old-growth components. Factors such as tree height, diameter, tree species, position on the surrounding topography, distance from water, and distance from disturbance also influence nest selection. Snags, trees with exposed lateral branches, or trees with dead tops are often present in nesting territories and are critical to eagle perching, movement to and from the nest, and as points of defense of their territory.

Birds and fish are the primary food source for eagles in Western Washington, but bald eagles will also take a variety of mammals and reptiles (both live and as carrion) when fish are not readily available (Knight et al. 1990). Eagles in tidally influenced habitats also scavenge and pirate more prey than do eagles at rivers or lakes, possibly resulting form expanded feeding opportunities provided by dead and stranded prey on tide flats (Watson and Pierce 1998).

Utilization of the Action Area

A species list obtained from the USFWS indicates that wintering bald eagles may occur in the vicinity of the proposed project. Several wintering bald eagles were observed along Ediz Hook by Corps biologists during a January 2002 field visit.

According to the WDFW priority habitat and species database, several bald eagle nests are located within 5 miles of the project area but further than three miles from the actual project location. Because no large trees or high roosts can be found on Ediz Hook, it is unlikely that any eagles breed in the immediate area.

Effects of the Proposed Action

Construction activities would occur during the nesting season. Because bald eagle nests are located in excess of three miles from the project location, construction activities would not directly disrupt eagle nesting and rearing of young. No communal night roosts or perch trees would be affected, as none are present near the site. Construction operations will be complete before the start of the wintering season.

Foraging bald eagles may be displaced by the noise of heavy equipment, but the availability of prey will not be significantly disrupted by the proposed maintenance work. Eagles should be somewhat accustomed to high levels of human activity in and near the project site. Eagles tend to tolerate more disturbances at feeding sites than in roosting areas (Steenhof 1978).

Effect Determination

Since construction activities will not occur during the wintering season, will not affect nesting habitat or behaviors, and only minor disruptions to foraging activities are expected, the proposed project **may affect, but is not likely to adversely affect** the bald eagle.

6.2 Marbled Murrelet

The marbled murrelet was listed as a threatened species under the Endangered Species Act of 1973, as amended, in October 1992. Primary causes of population decline include the loss of nesting habitat, and direct mortality from gillnet fisheries and oil spills.

Marbled murrelets forage in the near-shore marine environment and nest in inland old-growth coniferous forests of at least seven acres in size. Marbled murrelets nest in low-elevation forests with multi-layered canopies; they select large trees with horizontal branches of at least seven inches in diameter and heavy moss growth. Of 95 murrelet nests in North America during 1995, nine were located in Washington. April 1 through September 15 is considered nesting season;

however in Washington, marbled murrelets generally nest between May 26 and August 27 (USFWS 1999). Adults feeding young fly between terrestrial nest sites and ocean feeding areas primarily during the dawn and dusk hours.

Marbled murrelets spend most of their lives in the marine environment, where they forage in areas within 2 miles from shore. Murrelets often aggregate near localized food sources, resulting in a clumped distribution. Prey species include herring, sand lance, anchovy, osmerids, seaperch, sardines, rockfish, capelin, smelt, as well as euphasiids, mysids, and gammarid amphipods. Marbled murrelets also aggregate, loaf, preen, and exhibit wing-stretching behaviors on the water.

Although marine habitat is critical to marbled murrelet survival, USFWS' primary concern with respect to declining marbled murrelet populations is loss of terrestrial nesting habitat. In the marine environment, USFWS is primarily concerned with direct mortality from gillnets and spills of oil and other pollutants (USFWS 1996).

Critical habitat was designated for the marbled murrelet on May 24, 1996 (USFWS 1996). The critical habitat designation included only terrestrial nesting habitat. The critical habitat units nearest to the project site are approximately 6 miles to the south, within Olympic National Forest/Olympic National Park.

Utilization of the Action Area

Regional patterns of marbled murrelet activity in marine waters tend to be seasonal, and are tied to exposure to winter storm activity. There is a general shift of birds from the Strait of Juan de Fuca and British Columbia during spring and summer to areas in the San Juan areas and eastern bays during the fall and winter (Speich and Wahl 1995). Murrelets are often found in specific areas (e.g., Hood Canal, Rosario Strait/San Juans), as foraging distribution is closely linked to tidal patterns. However, occurrences are highly variable as they move from one area to another often in short periods of time.

Speich and Wahl (1995) found that summertime murrelet densities in Strait of Juan de Fuca kelp-cobble habitats ranged from 2.13 to 4.00 birds per km^2. In that habitat type, murrelets were present in only 33 to 50% of their censuses.

Effects of the Proposed Action

Construction activities would have no effect on murrelet nests or nesting habitat, as none occurs in the vicinity of the project. However, the proposed maintenance work would occur adjacent to foraging habitat. The noise associated with the shore-side operation of heavy equipment could disrupt foraging activities and cause murrelets to temporarily avoid the area.

The effects of human disturbance on murrelets at sea are not well documented, but they apparently habituate to heavy levels of boat traffic (Strachan et al. 1995). USFWS guidance suggests that noise above ambient levels is considered to potentially disturb marbled murrelets when it occurs within 0.25 mile of suitable foraging habitat (USFWS 1996). Beach nourishment and revetment maintenance operations will occur adjacent to suitable foraging habitat, but

substantial human activity along Ediz Hook is common and construction noise will be highly localized with respect to this species' foraging range. Marbled murrelets are relatively opportunistic foragers; they have flexibility in prey choice, which likely enables them to respond to changes in prey abundance and location (USFWS 1996). This indicates that if murrelets are present in the immediate vicinity of construction activities and if they are disturbed while foraging, they would likely move without significant injury. Therefore, the effect of noise disturbance associated with the proposed project is expected to be insignificant.

Maintenance of the Ediz Hook Beach Erosion Control Project is not expected to result in a long-term reduction in the abundance and distribution of murrelet prey items. Any reduction in prey availability would be expected to subside rapidly upon completion of the construction work.

Effect Determination

Since construction activities will have no effect on nesting habitat, long-term effects to the murrelet food base are not anticipated, and the effects of any noise disturbance during construction are expected to be insignificant, the proposed project **may affect, but is not likely to adversely affect** the marbled murrelet. The work will have **no effect** on designated critical habitat for this species.

6.3 Coastal/Puget Sound Bull Trout

The Coastal/Puget Sound bull trout population segment was listed as a threatened species under the Endangered Species Act of 1973, as amended, in October 1999. Bull trout populations have declined throughout much of the species' range; some local populations are extinct, and many other stocks are isolated and may be at risk (Rieman and McIntyre 1993). Combinations of factors including habitat degradation, expansion of exotic species, and exploitation have contributed to the decline and fragmentation of indigenous bull trout populations.

Bull trout are known to exhibit four types of life history strategies. The three freshwater forms include adfluvial, which migrate between lakes and streams; fluvial, which migrate within river systems; and resident, which are non-migratory. The fourth and least common strategy, anadromy, occurs when the fish spawn in fresh water after rearing for some portion of their life in the ocean.

Anadromous sub-adults and non-spawning adults are thought to migrate from marine waters to freshwater areas to spend the winter. Based on research in the Skagit Basin (Kraemer 1994), anadromous bull trout juveniles migrate to the estuary in April-May, then re-enter the river from August through November. Most adult fish entered the estuary in February-March, and returned to the river in May-June. Sub-adults, fish that are not sexually mature but have entered marine waters, move between the estuary and lower river throughout the year.

Utilization of the Action Area

The 1998 WDFW Salmonid Stock Inventory recognized four stocks of bull trout/Dolly Varden in the Strait of Juan de Fuca drainages: Upper Dungeness River, Dungeness/Gray Wolf, Lower Elwha River, and Upper Elwha River. The stocks are considered separate based on the

geographic distribution of their spawning populations. One bull trout/Dolly Varden was reported in Morse Creek but WDFW biologists believe it was probably a stray from the Elwha or Dungeness rivers and that no distinct stock exists in Morse Creek. Anadromous sub-adults and adults utilize estuarine and nearshore marine habitats in the Strait of Juan de Fuca for the feeding opportunities these areas present.

Effects of the Proposed Action

As described in Section 5., baseline water quality and habitat conditions will not be degraded by the proposed action. During and immediately after the placement of the nourishment materials, turbidity is not expected to increase substantially above ambient conditions due to the large grain size of the material. Since the placement of the nourishment materials will occur above the waterline at low tides, fish usage of the beach habitat will not be directly impacted by construction. The nourishment project is expected to result in a more natural beach profile.

As described in Section 5.3, indirect effects to bull trout prey species are not anticipated since no documented forage fish spawning beaches occur in the action area, and the epibenthic fauna which will be impacted by material placement do not appear to constitute a significant fraction of bull trout or forage fish diets.

Construction will occur outside of the February 16 - July 15 USFWS bull trout closure period for marine waters, likely between mid-July and mid-September. This closure period corresponds to the portion of the year when bull trout are most likely to be present in nearshore marine waters.

Effect Determination

The proposed project **may affect, but is not likely to adversely affect** bull trout. This determination is based upon the low likelihood that bull trout would be present in the action area during construction activities, and the lack of impacts to bull trout prey items.

6.4 Puget Sound Chinook Salmon

The Puget Sound Evolutionarily Significant Unit chinook salmon was listed as a threatened species under the Endangered Species Act of 1973, as amended, in March 1999.

Like all other Puget Sound/Strait of Juan de Fuca chinook, those observed near Ediz Hook are of the ocean-type race (NMFS 1998). Ocean-type chinook migrate to sea during their first year of life, normally within three months after emergence from spawning gravel. Growth and development to adulthood occurs primarily in estuarine and coastal waters (NMFS 1998). The amount of time juveniles spend in estuarine areas is dependent upon their size at downstream migration and rate of growth. Juveniles disperse to deeper marine areas when they reach approximately 65-75 mm in fork length (Simenstad et al. 1982). While residing in upper estuaries as fry, juvenile chinook have an affinity for benthic and epibenthic prey items such as amphipods, mysids, and cumaceans. As the juveniles grow and move to deeper waters with higher salinities, this preference changes to pelagic items such as decapod larvae, larval and juvenile fish, drift insects, and euphausiids (Simenstad et al. 1982).

Puget Sound marine areas designated as critical habitat include South Sound, Hood Canal, and North Sound to the international boundary at the outer extent of the Strait of Georgia, Haro Strait and the Strait of Juan de Fuca to a straight line extending north from the west end of Freshwater Bay, inclusive (NMFS 2000). Critical habitat consists of the water, substrate, and the adjacent riparian zone of accessible estuarine and riverine reaches. Both the project and action areas are designated critical habitat.

Utilization of the Action Area

According to the 1992 WDFW Salmon and Steelhead Stock Inventory, chinook salmon populations in the Dungeness, Elwha, and Hoko Rivers, as well as other streams in the western Strait of Juan de Fuca, are spring, summer, or fall runs (WDFW and WWTIT 1994). Elwha River chinook, which are supported by hatchery programs, have been limited to spawning in the lower 4.5 miles of the river since the construction of Lower Elwha Dam in 1914. Chinook spawn in the Dungeness River mainstem and in the lower five miles of the Gray Wolf River.

Given the marine location of the proposed project, any chinook present in the project area would likely be larger juveniles occupying waters deeper than the action area. These chinook would likely be feeding on pelagic items such as decapod larvae, larval and juvenile fish, drift insects, and euphausiids rather than the benthic and epibenthic prey items which serve as primary prey items for smaller chinook smolts in estuarine areas. This assumption is supported by food habit research in the Strait. Insects and calanoid copepods were the major prey items of juvenile chinook captured by Simenstad et al. (1977) in nearshore areas along the Strait of Juan de Fuca. Chinook were encountered primarily during August at sites in the western portion of the Strait. Juvenile fish also composed a high percentage of prey biomass, suggesting a generally pelagic feeding habit.

Both the project footprint and action area are within designated critical habitat for Puget Sound chinook.

Effects of the Proposed Action

The effects of the proposed action on chinook will be similar to those described for bull trout. Construction work will occur outside of the NMFS closure period for in-water work, March 1 through July 1. This closure period corresponds to the portion of the year when chinook are most likely to be present in nearshore marine waters.

Effect Determination

The proposed project **may affect, but is not likely to adversely affect** chinook salmon or designated critical habitat for this species. This determination is based upon the localized geographic scope of the project, and the low likelihood that chinook would be present in the action area during construction activities. Nourishment activities are not expected to impact prey of any juvenile chinook occurring the Strait.

6.5 Hood Canal Summer-Run Chum Salmon

The Hood Canal Summer-Run chum salmon Evolutionarily Significant Unit was listed as a threatened species under the Endangered Species Act of 1973, as amended in March 1999. Chum have evolved to migrate immediately to marine waters upon hatching, limiting their freshwater life history. This life history strategy, which chum salmon share with pink salmon (*Oncorhynchus gorbuscha*), reduces the mortality associated with the variable freshwater environment but makes chum more dependent on estuarine and marine habitats.

When the fry first enter saltwater they assemble in small schools and reside close to shore to avoid predators. As the young fish grow, they gradually move to deeper waters and generally migrate towards open ocean waters. Some chum salmon juveniles will remain in nearshore marine waters until late in their second year before migrating to the open ocean. Mortalities during this early marine life period are primarily the result of predation by birds and other fish species.

Designated critical habitat for the Hood Canal Summer-Run ESU chum includes the estuarine/marine areas of Hood Canal, Admiralty Inlet, and the Strait of Juan De Fuca to the international boundary and as far west as a straight line extending north from Dungeness Bay. Since the project is located west of Dungeness Bay, neither the project footprint nor the action area are within designated critical habitat for Hood Canal chum.

Utilization of the Action Area

The 1992 WDFW Salmon and Steelhead Stock Inventory recognized two stocks of Hood Canal summer chum, Hood Canal and Union (WDFW and WWTIT 1994). Spawning occurs primarily in the Big Quilcene, Dosewallips, Duckabush, Hamma Hamma, and Union Rivers. These stocks enter the terminal area from early August through the end of September, with spawning generally beginning around the last week of August and continuing through October (WDFW and WWTIT 1994). Juvenile outmigration occurs from late February into May (Williams et al. 1975).

Epibenthic organisms were the major prey items of juvenile chum captured by Simenstad et al. (1977) in nearshore areas along the Strait of Juan de Fuca. Chum were captured by beach seine during May at the two westernmost sites sampled, Pillar Point and Kydaka Beach. Harpacticoid copepods, gammarid amphipods, and cumaceans were the most frequently occurring items in the stomach contents sampled. Pelagic calanoid copepods were also present in a high percentage of fish.

Effects of the Proposed Action

The effects of the proposed action on chum will be similar to those described for bull trout and chinook. But unlike bull trout and juvenile chinook, juvenile chum are more reliant on epibenthic prey. The impacts to epifauna, particularly gammarid amphipods, likely to result from the proposed action could potentially have more impact on chum than on the other listed salmonids.

Due to the steep beach profile and extreme wave exposure along the action area, epifauna are likely relatively patchy and scarce on the beach fronting the Ediz Hook revetment (see Benthic Epifauna discussion in Section 5.3). Low prey densities and such high-energy conditions are not optimal for foraging young of the year chum. Older chum would be expected to forage primarily in deeper waters offshore. Any chum present in the action area in the months after the nourishment would likely encounter a reduction in epifauna densities compared to baseline conditions. However, this impact is not expected to be significant since construction work will occur outside of the NMFS closure period for in-water work, March 1 through July 15. This period corresponds with the outmigration and early marine residence of young of the year chum. In addition, the project is fairly localized with respect to this species' foraging range.

The benthic impacts described in Section 5.3 are not expected to be long-lasting. As the nourishment stockpiles erode and reduce the slope of the beach, the prime elevation range for amphipod production, approximately +1' to +7' MLLW (Nyblade 1978), should increase in area. So while there will be a short-term reduction in amphipod densities, production would ultimately be expected to increase and baseline conditions would be enhanced.

Effect Determination

The proposed project **may affect, but is not likely to adversely affect** chum salmon. This determination is based upon the lack of significant water quality impacts, and the short-term, localized nature of any reductions in prey abundance which may occur.

6.6 Steller Sea Lion

The Steller sea lion was listed as a threatened species under the Endangered Species Act of 1973, as amended, in November 1990. In 1997, the North Pacific's population of Steller sea lions was separated into two distinct stocks, one of which was reclassified as endangered. The status of the eastern stock, which includes the population inhabiting the waters of the Washington coast, remains unchanged.

Two types of terrestrial habitats are utilized by Steller sea lions: rookeries are areas where adults congregate for breeding and pupping, and haul-outs are areas used for rest and socializing. Sites used as rookeries during the breeding season may be used as haul-outs during the remainder of the year. Steller sea lions haul-out on offshore islands, reefs, and rocks, while rookeries generally occur on beaches. Preferred rookeries and haul-out areas are located in relatively remote areas where access by humans and mammalian predators is difficult; locations are specific and change little from year to year (Steller Sea Lion Recovery Team 1992).

When not on land Steller sea lions are generally seen inshore, less than 5 miles from the coast. Steller sea lion foraging patterns vary depending upon age, season, and reproductive status, as well as the distribution and availability of prey. Foraging patterns of females during the winter months vary considerably; individuals travel an average of 133 km and dive an average of 5.3 hours per day. The vast majority of feeding dives occur to a depth of 100 m. The diet of Washington's Steller sea lions is not well known; primary prey items may include cod, pollock,

rockfishes, herring, and smelt (Gearin and Jeffries 1996). They appear to be largely opportunistic feeders.

In 1993, NMFS designated critical habitat for the Steller sea lion. No critical habitat occurs in Washington.

Utilization of the Action Area

Steller sea lions may be observed in Puget Sound year round, but they are most abundant during the fall and winter months. The Steller sea lion haul out sites nearest to the action area are located near Carmanah and Sombrio Point on Vancouver Island (Jeffries et al. 2000). No breeding rookeries have been identified in Washington waters; however, in 1992 a single pup was born on Carroll Island (WDFW 1993).

Effects of the Proposed Action

Given the lack of rookery and major haul-out areas near Ediz Hook, when in the action area Steller sea lions are likely on foraging expeditions. Construction activities will have no effect on breeding habitat or behavior, and are unlikely to affect the Steller sea lion prey base. Construction activities would occur in an area with substantial human activity on both the waterward and landward sides of the shoreline. Additional noise from the shore-side operation of heavy equipment may have a minor effect on foraging opportunities. No boat operations will be a part of construction activities. Short-term impacts of any sound disturbance related to construction activities would likely result in displacement of animals rather than injury. The potential for long-term or indirect impacts of the proposed project to Steller sea lions is minimal. The proposed work is not anticipated to degrade water quality significantly.

Effect Determination

This project is **not likely to adversely affect** the Steller sea lion since the potential for significant sound disturbance or impacts to water quality and prey abundance are highly unlikely. The project will have **no effect** on designated critical habitat for this species.

6.7 Humpback Whale

In 1970 the humpback whale was listed as a endangered species under Endangered Species Conservation Act of 1969. The humpback is currently listed as endangered under the Endangered Species Act of 1973.

During the summer, North Pacific humpbacks feed in coastal areas; greatest numbers generally occur off the Aleutian Islands and California coast. The primary prey item of humpback whales is euphausiids, but they also feed on schooling fish such as anchovies, herring, sand lance, capelin, sardines, cod, and juvenile salmonids (Nitta and Naughton 1989). When not migrating, they occur very close to shore. Humpbacks visit coastal and inside waters more often than other large whale species, with the exception of the gray whale. At one time humpbacks were one of the most frequently sighted whales in Washington's inside waters.

Utilization of the Action Area

Humpback whales are intermittently sighted in the Strait of Juan de Fuca, but those observed do not remain for long periods and are considered stragglers. The likelihood that a humpback whale would be offshore of the action area during construction is low.

Effects of the Proposed Action

No boat operations will be a part of construction operations, but noise above ambient levels will be produced. Since any humpback that happened to be near the action area during the construction period would likely be offshore and not along Ediz Hook, this noise is not expected to have any effects. Beach nourishment and revetment maintenance will not increase vessel traffic in the area, and construction activities are not anticipated to degrade water quality or decrease prey availability except perhaps in an extremely localized area directly adjacent to the project site.

Effect Determination

The proposed project will have **no effect** on the humpback whale.

6.8 Leatherback Sea Turtle

The leatherback turtle was listed as endangered throughout its range in June 1970. Leatherbacks nest in tropical and subtropical areas, but unlike other sea turtles they can survive in cold waters. The largest nesting colonies in the eastern Pacific are located in Mexico and Costa Rica (Plotkin 1995). The leatherback is the most pelagic of the sea turtles, most often found near the edge of the continental shelf. However, in northern waters they are reported to sometimes enter shallow estuarine bays. The primary food item of leatherbacks is jellyfish, but they will also eat fish, mollusks, squid, and sea urchins.

Habitat destruction, incidental catch in commercial fisheries, the harvest of eggs and flesh are the greatest threats to the survival of the leatherback. Critical habitat for the leatherback had been designated in the U.S. Virgin Islands.

Utilization of the Action Area

Leatherback sea turtle nesting grounds occur between 40°N and 35°S (Plotkin 1995), so no nesting areas are located in Washington. While this species may use oceanic areas off the coast of Washington as foraging grounds during the summer and fall months, aerial surveys indicate that when off the U.S. Pacific coast leatherbacks usually occur in continental slope waters (NMFS and USFWS 1998).

Effects of the Proposed Action

No boat operations will be a part of construction operations, but construction associated with the beach nourishment and revetment maintenance will produce noise above ambient levels. Since any turtle that happened to be in the action area during the construction period would likely be offshore and not along Ediz Hook, this noise is not expected to have any effects. The beach

nourishment and revetment maintenance will not increase vessel traffic in the area, and construction activities are not anticipated to degrade water quality or decrease prey availability except perhaps in an extremely localized area directly adjacent to the project site.

Effect Determination

Given the distribution and mobility of the leatherback sea turtle, the proposed project will have **no effect** on the species or its designated critical habitat.

6.9 Puget Sound/Strait of Georgia Coho Salmon

In July 1995, NMFS determined that listing was not warranted for the Puget Sound/Strait of Georgia ESU coho salmon. However, the ESU is designated as a candidate for listing due to concerns over specific risk factors.

Coho salmon within this ESU are abundant and, with some exceptions, run sizes and natural spawning escapements have been generally stable. However, artificial propagation of coho salmon appears to have had a substantial impact on native, natural coho salmon populations, to the point that it is difficult to identify self-sustaining, native stocks within this region (Weitkamp et al. 1995). In addition, continuing loss of habitat, extremely high harvest rates, and a severe recent decline in average size of spawners indicate that there are substantial risks to whatever native production remains. There is concern that if present trends continue, this ESU is likely to become endangered in the foreseeable future (Weitkamp et al. 1995).

Utilization of the Action Area

The 1992 WDFW Salmon and Steelhead Stock Inventory notes that coho utilize, to some degree, almost all of the accessible tributaries draining into the Strait of Juan de Fuca. Coho returning to these streams typically enter fresh water from mid-September to early November and spawn from late October through January, with some variation observed between streams and between years within streams. There have been substantial releases of hatchery-origin coho within this region.

Effects of the Proposed Action

The effects of the proposed action on coho will be similar to those described for chinook and chum.

Effect Determination

Effect determinations are not made for candidate species.

7. INTERRELATED AND INTERDEPENDENT EFFECTS

There are no interrelated or interdependent actions associated with the proposed action.

8. CUMULATIVE EFFECTS

Daishowa America Company, Ltd. has an HPA for maintenance of the Elwha waterline between Dry Creek and the base of Ediz Hook. Since shoreline armoring associated with this waterline restricts beach nourishment by the feeder bluffs west of Ediz Hook, WDFW requires gravel placement as mitigation for armor rock placed adjacent to the waterline. Daishowa's current permit requires one cubic yard of mixed gravel cobble for every cubic yard of rock placed (Shaffer, pers. comm.). WDFW is currently reviewing the HPA for renewal and, as part of that review, is working to estimate the quantity of sediment which historically recruited from the bluffs. WDFW's goal is to calculate material volumes which can be applied regularly to better mitigate for the impact of the bulkhead (Shaffer, pers. comm.). The material placed by the Corps at Ediz Hook will be factored into WDFW's volume estimates. Daishowa's beach nourishment activities will have impacts similar to those of the Corps project. The placement of gravel nourishment materials will be subject to a Corps 404 permit, and thus will be included in a future Section 7 consultation.

The Corps knows of no other non-Federal actions that are reasonably certain to occur that may adversely affect a listed, proposed, or candidate species within the action area.

9. CONCLUSION

Table 3. summarizes the effect determinations made for each of the species potentially occurring in the project vicinity.

Table 3. Determination Summary Table

Species	Effect Determination	Critical Habitat Determination
Bald Eagle	Not likely to adversely affect	—
Marbled Murrelet	Not likely to adversely affect	No effect
Bull Trout	Not likely to adversely affect	—
Chinook	Not likely to adversely affect	Not likely to adversely affect
Chum	Not likely to adversely affect	No effect
Steller Sea Lion	Not likely to adversely affect	No effect
Humpback Whale	No effect	—
Leatherback Sea Turtle	No effect	No effect

10. ESSENTIAL FISH HABITAT

The project area has been designated as Essential Fish Habitat (EFH) for various life stages of 17 species of groundfish, 5 coastal pelagic species, and three species of Pacific salmon.

Essential Fish Habitat (EFH) for the Pacific coast salmon fishery is those waters and substrate necessary for salmon production needed to support a long-term sustainable fishery and salmon contributions to a healthy ecosystem. Salmon EFH and potential adverse impacts to EFH have been identified by the Pacific Fishery Management Council (PFMC). Important features of marine EFH for salmon are: (1) adequate water quality, (2) adequate temperature, (3) adequate

prey species and forage base, (4) adequate depth, cover, marine vegetation, and algae in estuarine and near-shore habitats (PFMC 1999).

The proposed action will not result in excessive levels of organic materials or inorganic contaminants. The action will not result in physical alterations which could affect water temperature. Water quality (turbidity) may be temporarily impacted during and shortly after placement of the nourishment materials, but no long-term degradation will occur. Beach contours will be modified, but in a way which mimics more natural conditions. The action will not remove large woody debris or other natural beach complexity features, nor is it likely to affect any vegetated shallows. Benthic productivity beneath and adjacent to the gravel/cobble stockpiles will be temporarily impacted, but significant effects to prey species are not anticipated.

The marine extent of groundfish and coastal pelagic EFH includes those waters from the nearshore and tidal submerged environments within Washington, Oregon, and California state territorial waters out to the exclusive economic zone (370.4 km) offshore between the Canadian border to the north and the Mexican border to the south. There are seven composite EFH's: estuarine, rocky shelf, non-rocky shelf, canyon, continental shelf/basin, neritic and oceanic habitats. The proposed beach nourishment project will occur exclusively over rocky shelf habitat, which is defined as those waters, substrates, and associated biological communities living on or within ten meters overlying rocky areas, including reefs, pinnacles, boulders and cobble, along the continental shelf, excluding canyons, from the high tide line MHHW to the shelf break (~200 meters).

The *Adverse Nonfishing Impacts and Recommended Conservation Measures* portions of the groundfish and coastal pelagic EFH appendices identify several impacts of filling projects on EFH. Those impacts include: (1) adverse effects on infaunal and bottom-dwelling organisms; (2) changes to benthic habitats resulting from erosion, slumping, or lateral displacement of surrounding bottom deposits; (3) elevated turbidity which may impact aquatic vegetation or directly affect fish species; (4) changes to the chemistry and physical characteristics of the receiving water; and (5) loss of habitat function due to burial.

As described in Section 5. of this BE, the proposed project is not expected to result in a significant increase in turbidity due to the large grain size of the nourishment materials. The nourishment materials will be clean, washed gravels/cobbles from an upland source, so the potential for contamination is extremely low. The project will alter the beach profile along Ediz Hook above the –10' MLLW depth contour, but this change will result from more natural sediment transport processes compared to current conditions. The project will have little or no impacts on the kelp bed offshore of the revetment, given the time of year the material will be placed. A short-term impact to benthic infauna and epifauna productivity in the stockpile footprints is expected to result from the project, but the amount of habitat impacted is relatively small compared to the total EFH habitat identified for any of the species evaluated. In no case does the habitat provided by the disposal sites represent any unique habitat that is limited in distribution or is not available elsewhere.

Fills/dredge material disposal conservation measure 1. for the coastal pelagic species indicates that use of clean fill material for beach replenishment and other beneficial uses is encouraged (PFMC 1998a).

The Corps has determined that the proposed action will not reduce the quality and/or quantity of EFH for Pacific salmon, coastal pelagic, and groundfish EFH are not anticipated. No adverse effects to EFH are expected to result from the proposed action.

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APPENDIX A
Photographs of the Project Site

Photo 1 Department of Ecology Shoreline Aerial Photo of Ediz Hook (7/94).

Photo 2 Department of Ecology Shoreline Aerial Photo of outer Ediz Hook (7/94).

Photo 3 Department of Ecology Shoreline Aerial Photo of feeder bluff west of Ediz Hook blocked by City of Port Angeles water line and armor stone (7/94).

Photo 4 Beach fronting Corps revetment (10/17/01). Note the armor stones which have tumbled from the structure. Readily accessible stones will be re-keyed into the structures as part of the proposed maintenance project.

Photo 5 View of the Corps revetment along the access road (10/17/01). The Strait of Juan de Fuca is to the left, and Port Angeles Harbor is to the right.

Photo 6 End effect erosion at the eastern end of the revetment (10/17/01). Ten to twelve inch cobbles will be placed in the scour hole fronting the revetment stone.

Photo 7 Substrate variability and wrack composition on the beach fronting the revetment (10/17/01).

Photo 8 Substrate variability and wrack composition on the beach fronting the revetment (10/17/01).

Photo 9 Natural beach at tip of spit (10/17/01).